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ABSTRACT

American youths have experienced labor market adversity during the last decade. This project analyzed the reasons for earnings disparity among white and nonwhite, males and females in the labor market. The comparison was made by using the human capital framework to analyse the extent to which various personal characteristics and market factors contribute to earnings for a representative sample of American youths. The data used in this study were obtained from a survey conducted by the Opinion Research Center for the Division of Extension at the University of Texas. These data provide information about the earnings, age, training, schooling, location, occupation, and functional competency or ability of the persons surveyed. The analysis of these data determined the returns on various forms of human capital investment for the different groups. It was found that increased competency or functional literacy was most important to white females and nonwhites in explaining labor market success. White male youths' performance in the labor market was not greatly affected by increased competence. The study recommended that functional competency improvement programs be made available to youths. (Author)

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FINAL REPORT

THE HUMAN CAPITAL MODEL AND AMERICAN YOUTHS: THE ROLES OF SCHOOLING, EXPERIENCE AND FUNCTIONAL LITERACY

Principal Investigator: Stuart Greenfield

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ABSTRACT

"The Human Capital Model and American Youths: The Roles of Schooling, Experience and Functional Literacy"

Southwest Educational Development Laboratory

Principal Investigator: Stuart Greenfield

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American youths have experienced labor market adversity during the last decade. This project analyzed the reasons for earnings disparity among white and nonwhite, males and females in the labor market. The comparison was made by using the human capital framework to analyze the extent to which various personal characteristics and market factors contribute to earnings for a representative sample of American youths. The data used in this study were from a survey conducted by the Opinion Research Center for the Division of Extension at the University of Texas (Northcutt, 1975). These data provide information about the earnings, age, training, schooling, location, occupation, and functional competency or ability of the persons surveyed. The analysis of these data determined the returns on various forms of human capital investment for the different groups. It was found that increased competency or functional literacy was most important to white females and nonwhites in explaining labor market success. White male youths performance in the labor market was not greatly affected by increased competence.

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CHAPTER I

INTRODUCTION AND RECENT TRENDS

Introduction

Considerable effort has been made to model the earnings determination process for population subgroups in the United States. This research has attempted to provide a better understanding of the factors contributing to income or earnings disparities among age, race and sex cohorts. Various theories have been posited and models tested to explain differential earnings.[1] These models have generally related the earnings of an individual to a set of explanatory variables, e.g., education, ability, experience, residence, marital status and race.

Building upon previous research on the earnings determination process, and upon the economics of discrimination, this research seeks to provide a better understanding of the earnings determination process of youths in the labor market.[2] By isolating the factors contributing to the earnings of white and nonwhite, male and female youths, public policies aimed at alleviating and/or improving the earnings disparities among these groups can be formulated and instituted.

Recent Trends

During the last decade considerable concern has been expressed over the plight of youths entering the labor market. In addressing this problem both demand and supply phenomena have been offered as explanations. The demand proponents argue that the principal reason for high and persistent

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[1]Excellent surveys of this literature are contained in Cain (1976); Marshall (1974); Mincer (1970) and Sahota (1978).

[2]In this study youths are defined as individuals aged 16-24 years of age.

unemployment among youths is the lack of adequate demand for young workers due to such factors as slow economic growth; cyclical weaknesses in the economy; changes in the mix of jobs; and minimum wages. The supply view is that youth joblessness arises because of a lack of skills, incentives and/or aspirations on the part of the young (Freeman, 1980, p. 6-7). Determining which of these different economic forces underlies the youth unemployment problem is critical for formulating policies and programs to remedy the situation. By reviewing the changes that have occurred during the last decade, some insight to the factors contributing to this problem can be gained.

In 1960, 15.1 percent of the population was between 14 and 24 years of age. By 1970 the percent of this population had increased to 19.8 percent. During the 1970's the proportion of the population in this cohort was approximately 21.0 percent. According to census projections the proportion of the population within this age group will decline and by the year 2000 should only be about 16.0 percent of the U.S. population (Census, 1978).

This increase in the cohort size has been offered as one reason for the high unemployment levels experienced by the young. In a recent study Wachter and Kim (1979) found that changes in cohort size explain at least part of the trend in employment of youths. Two other studies (Welch, 1979 and Freeman, 1979) showed that an inverse relationship existed between a cohort's size and the average wage received by its members.

According to the recent Survey of Income and Education (see Table 1), the labor force participation rate among youths ranged from 77.8 percent (white males) to 53.2 percent (nonwhite females). As one will note the white male participation rate is over 13 percentage points higher than any of the other three youth groups. However, when comparing employment rates

Table 1

Employment Status of Civilian Youths, by Race and Sex, Spring 1976 (Numbers in Thousands)

	White		Nonwhite	
	Male	Female	Male	Female
Total	14,755.7	15,236.7	2,352.9	2,688.6
In Labor Force	11,486.3	9,605.4	1,511.9	1,429.3
(percent of total)	77.8	63.0	64.3	53.2
Percent Employed	86.7	68.6	85.7	64.4

Source: Survey of Income and Education, Spring 1976.

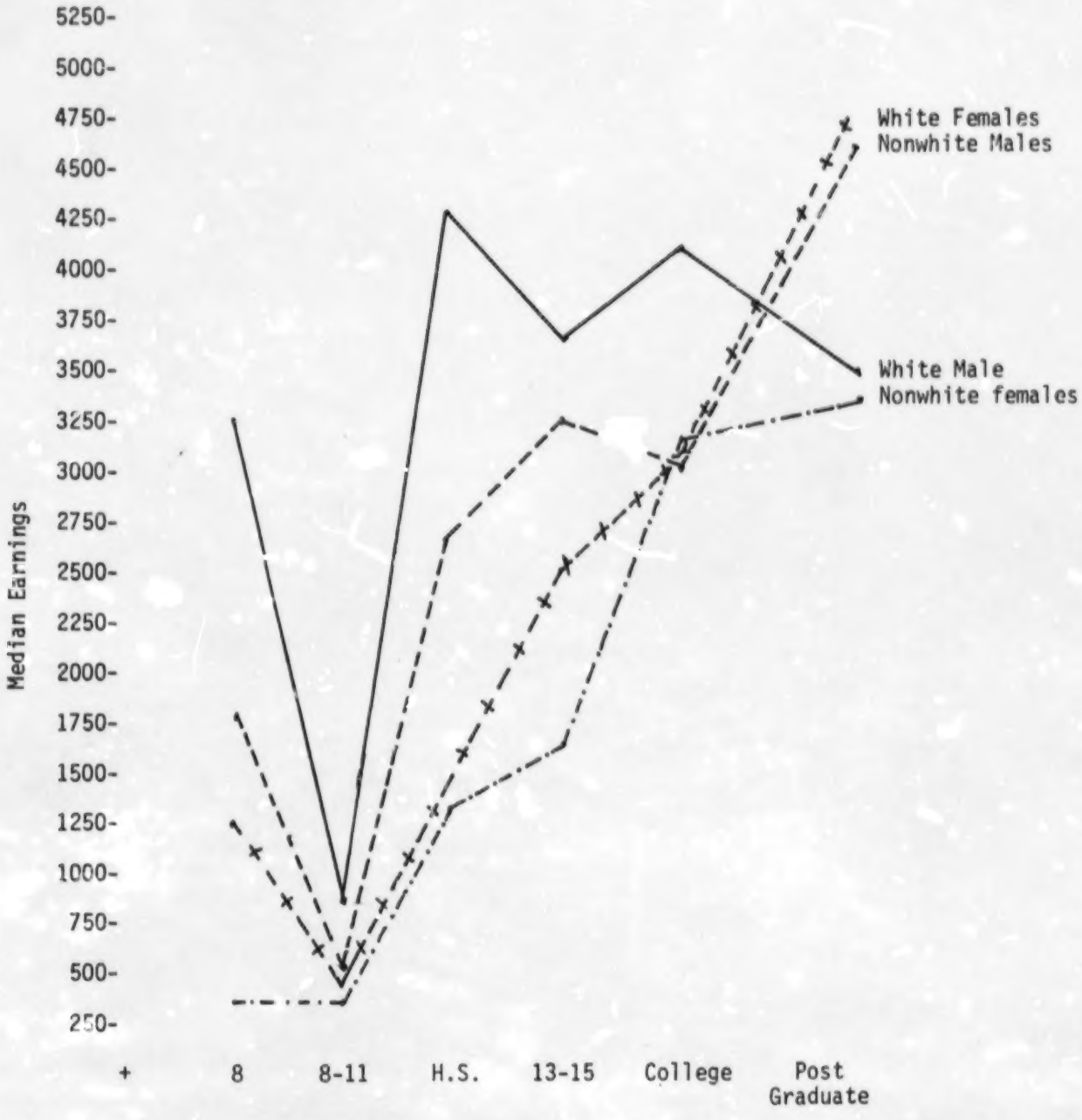
among these groups little difference exists when the comparison is within each of the sex groups. That is both white and nonwhite males have comparable employment rates (86.7 percent versus 85.7 percent). Females also have comparable employment rates. The white female rate being 68.6 percent, while the nonwhite female rate is 64.4 percent.

While the employment rate within sex groups is comparable, the more important question is whether this employment is converted into earnings. Figure 1 shows the earnings profiles among youths in the civilian labor market by years of school completed. Except for those with post-graduate education, young white male median earnings exceed that of any of the other groups. In this education category, both white females and nonwhite males have median earnings greater than young white males. From these data the importance of education credentials to white youth earnings is indicated. For both the white males and females, possession of a degree substantially improves earnings. Nonwhite females' earnings steadily improve with additional schooling. A surprising fact indicated in this figure is the drop in median earnings of nonwhite male earnings from those with some college to those who completed college. For each of the other groups, completion of college increases earnings.

The next section contains a review of the literature, both on the evolution of the human capital model and its implementation for examining earnings differences among youth groups. Chapter III is devoted to a comparative analysis of the earnings determination process among the four cohorts. While Chapter IV reviews these findings and the policy implications emanating from this research.

Figure 1

Median Earnings of Youths in the Labor Force by Years of School Completed, Spring 1976



Source: Survey of Income and Education, Spring 1976

CHAPTER II

THE HUMAN CAPITAL MODEL: ITS EVOLUTION AND USE

Evolution of the Human Capital Model

In their efforts to explain racial earnings differentials human capital empiricists customarily invoked what Mincer (1970) has since labeled the "heroic schooling model":

$$(2.0) \qquad Y_{ij} = \beta_{0j} + \beta_{1j}S_{ij} + e_{ij}$$

where the earnings of the ith individual of the jth race are represented as a linear or exponential function of the years of schooling of that individual.

In this formulation, the schooling model (Becker, 1975; Becker and Chiswick, 1966) yielded upwardly biased estimates of returns to schooling and significantly large unexplained residuals in racial income disparity. Policy prescriptions of the schooling model led to an overemphasis on the quantity of schooling and overt, residual discrimination as dominant factors in the income disadvantages of racial minorities. The human capital model has been invoked as evidence of the importance of schooling or institutional training in the earnings equalization policy prescriptions of the 1960's and as an indicator of an overtly discriminatory demand for labor (Arrow, 1972).

As the human capital approach to the study of earnings discrimination has matured from its early specification, attempts were made to explain previously unexplained "residual" discrimination and to correct biased estimates of the returns to schooling through the expansion of the number of explanatory regressors to form what is considered to be a more comprehensively defined human capital argument:

$$(2.1) \qquad Y_{ij} = \beta_{0j} + \sum_{K=1}^{k} \beta_{jk} X_{ijk} + e_{ij}$$

In this model X_{ijk} is a vector of K "human capital" characteristics (of which S_{ij} is only one) for the members of the jth group. In this form of the model earnings differentials can be viewed as the interaction of two phenomena: the disparate allocation of the numan capital components themselves (X_{ijk}); and the disparate market returns (β_{jk}) to existing accumulations of human capital among the j groups. The former is cited as evidence of an element of institutional earnings discrimination, while the latter has been attributed to a residual element of overt market discrimination (Arrow, 1972, 1973).

As the human capital model has been empirically tested, specification problems have been recognized and attempts have been made to correct them through three techniques: (1) the introduction of previously omitted relevant explanatory variables, such as post-school human investments (Mincer, 1962, 1970, 1974), socioeconomic background characteristics (Bowles, 1972, 1973; Bowles and Levin, 1968; Bowles and Nelson, 1974; and Griliches and Mason, 1972), industrial occupation variables (Wachtel and Betsey, 1972, 1975) and occupational indices (Duncan, 1969; and Weiss, 1970); (2) the control for "quality" of the explanatory schooling variable (Gwartney, 1970; Hansen, Weisbrod and Scanlon, 1970; Duncan, 1969; Weiss, 1970; Griliches and Mason, 1972; and Masters, 1974); and (3) the experimentation with exponential formulation of the earnings equation (Thurow, 1969; Mincer, 1970, 1974; Chiswick, 1974; Welch, 1973). These more "sophisticated" specifications have demonstrated that earlier estimates of returns to schooling for subgroups had been upwardly biased, and researchers have begun to examine alternative mechanisms through which earnings are determined by various components to the human capital package. The large unexplained residuals that appeared to the utility theorists

(Becker, 1957; and Arrow, 1972) as evidence of overt discrimination have dwindled with improved model specification.

As the expanded model is now viewed, earnings differentials can exist among demographic groups for two reasons. First, members of a group may receive disparate earnings because of disparate quantities of human capital components embodied within the members of that group. If a model, such as the naive model, observes different returns to one component of human capital, such as years of schooling, it might well be because of a failure to control for the accumulation of other components of human capital, such as environmental and post-school training. Second, earnings disparities may exist after controlling for differences in the quantities of human capital components, if the labor market, or markets, pay different prices for similar quantities. This price component of earnings disparity, or the rate of return differences to human capital components may exist for individuals and groups for several reasons. The varying market prices may reflect (1) varying "qualities" of accumulated "human capital;" (2) the fact that different race-sex groups and their embodied investments are subject to the going "prices" in completely segmented labor markets;[3] and (3) the race-ethnic groups functioning within a single market may be subject to overt wage or earnings discrimination. If the expanded human capital model, then, observes disparate returns to the components of human investment, we might presume disparate quality of like quantity investments, the presence of segmented markets or overt discrimination.

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[3]Labor markets are segmented by supply factors such as location and human capital accumulations (see Cairnes, 1874 and Flanagan, 1973), but also by demand, or market factors that determine different prices for similarly embodied supply factors (see Dunlop, 1957; Wachtel and Betsey, 1972).

Most of the expansion of the human investment paradigm or model has resulted, not from the refinement of theory, (it is tautologically valid) but from the availability of new, improved, comprehensive data sources. The construction of an experience variable, with some assumptions, has never been a limiting factor (Mincer, 1962, 1974; and Chiswick, 1972, 1974). However, the supposition that years of schooling is an unbiased estimator or "learning" severely restricted efforts to isolate the extent to which earnings differentials might separately reflect the "quality" of schooling. This quality of schooling derivation had been discussed in theory, but not embodied in empirical work until the availability of achievement scores such as the AFQT test data (Griliches and Mason, 1972; Hansen, Weisbrod and Scanlon, 1972; O'Neill, 1970), and 1965 USOE-Coleman data (Gwartney, 1970, 1972; and Weiss, 1970).

Youths: Use of the Human Capital Model

As discussed above the concept of human capital derives from the view that many activities undertaken by individuals involve both costs and benefits. These human activities can be analyzed in a way similar to that of investment in physical capital, where the investment decision is motivated by the payoff accruing to the firm. In the human capital context, a payoff can accrue both to the individual and to society.

Much of the previous research on the youth labor market has focused on the high unemployment rate experienced by this cohort. Of particular concern has been the role of schooling in determining labor market success. Both Danziger (1975) and Hansen, Weisbrod and Scanlon (1970, 1972) found that even among groups with relatively low levels of education, a positive relationship existed between years of schooling and labor market status.

It has also been found useful to distinguish both among types of

educational programs (Grasso, 1975) and the quality of schooling (Kohen, 1973; Taubman and Wales, 1975; and Wachtel, 1975). In this study the quantity of schooling, type of schooling received and quality of schooling is considered.

Another variable considered in analyzing labor market success is experience. While labor market experience has been a difficult concept to measure, its importance in explaining earnings differentials is well documented. In a recent study Vrooman and Greenfield (1978) found that the major factor explaining earnings differentials among adults was differences in their return to experience. Similar results were obtained by Blinder (1973) in his study of white and black male wage differentials. In another recent study, Grasso and Myers (1977) found that how work experience affected labor market success differed among white and black youths. Their findings indicate that young white males advance in pay and status as work experience is gained. In contrast young black males enjoyed substantially less success as they gained work experience.

Other factors which have been utilized in analyzing the youth labor market include both those representing personal characteristics as well as environmental influences. These factors have been included in these analyses in order to avoid attributing to the human capital investment factors the effect of these factors on labor market success.

An example of this is the observation that intelligence is related to the amount of schooling a person acquires (Hause, 1975; and Solomon, 1973). In this study the Adult Performance Level (APL) score is used as a measure of functional competency or literacy. By using this variable, one is able to differentiate the portion of labor market success due to education and "ability."

Another important variable which has been hypothesized to impact earnings is residence. It is well known that the earnings of rural residences is substantially lower than those residing in urban areas.

In the chapter which follows a structural model of the earnings determination process is estimated for each of the four subgroups. From the estimated results, comparison of the process by which earnings are generated among these groups will be made. It is hoped that by isolating the path(s) each of these groups follow, programs can be better directed to assist these groups in achieving labor market success.

CHAPTER III

STUDY FINDINGS

Source of Data

The unique data for this project are derived from a study conducted by Opinion Research Corporation for the Extension Division of the University of Texas at Austin (ORC, 1974) (see Appendix A). These data are unique in that the purpose of the survey was the administration of an examination developed by the Adult Performance Level Project of the Division of Extention to measure the "functional competency" of U.S. adults (Northcutt, 1975). Also available from the survey are a number of relevant "human capital," economic and demographic characteristics such as: years of formal and vocational schooling, age, residential location, employment status, race, sex and weekly earnings of the respondents.

The universe for the survey was defined as the U.S. population aged 18 through 65 years, who were living in households and were physically able to read and write. The APL examination was developed to test the competency of adults within each of six areas: occupational knowledge, consumer economics, health, community resources, government and law and transportation. The scores were coded and the sample was tricotomized into levels of adult fuctional competence: APL, functionally incompetent; APL 2, marginally competent; and APL 3, functionally proficient. Testing was conducted by the Opinion Research Corporation from December, 1973 to January, 1974 on a master sample of the population universe.

From this survey individuals 18 through 24 years of age and in the labor force were selected for analysis. Table 2 presents summary statistics for those selected from the survey. For each of the four groups (white and non-white, males and females) analyzed, data on human capital

Table 2

Summary Statistics for Youths[1]

	Males		Females	
	White	Nonwhite	White	Nonwhite
N	670	108	480	179
APL (Average Score)	2.41 (0.60)	1.85 (0.77)	2.25 (0.72)	1.53 (0.71)
SCH (Average Score)	12.23 (2.11)	11.60 (1.87)	12.24 (2.30)	12.16 (1.47)
VOC (Average Years)	0.36 (0.98)	0.08 (0.27)	0.12 (0.46)	0.12 (0.42)
EXP (Average Years)	3.58 (2.80)	4.10 (2.57)	3.44 (2.90)	4.12 (2.30)
MET (Proportion Urban)	0.71 (0.45)	0.85 (0.36)	0.84 (0.37)	0.88 (0.33)
EMP (Proportion Fulltime Employed)	0.63 (0.48)	0.51 (0.50)	0.39 (0.49)	0.53 (0.50)
IOP (Average Earnings for Occupation)	155.65 (86.80)	114.09 (96.88)	120.94 (107.30)	90.47 (69.17)
ERN (Average dollars per week)	111.24 (88.34)	65.84 (60.13)	62.62 (57.88)	59.32 (69.00)

[1]Standard deviations are in parentheses.

Source: ORC, 1974.

investment, i.e., years of school (SCH), years of vocational training (VOC) and experience (EXP), are shown. Data of weekly earnings (ERN) and an index-of-occupational position (IOP) are also presented. The competency level is given by the APL variable.

These data point out some general characteristics of the selected sample. Whites have greater quantities of formal schooling, and of vocational training, higher achievement indices and less experience than their nonwhite counterparts. The whites in this sample also have higher average earnings, and are in occupations which possess a higher earnings potential.

A critical problem could lie in the APL score. If the APL examination is racially and/or sexually biased in a manner unlike the earnings determination process, conclusions based on an analysis of APL on IOP or ERN may be biased (Ashenfelter and Taussig, 1971). In the design of the APL exam every effort was made to control for the culturally biased test problem, it is assumed these efforts were successful. The APL score should indicate racial-sexual "achievement" disparity greater than the simple schooling disparity would lead us to suspect.

Finally, although the white males possess occupation and earnings advantages over the other sample groups, we note that only the white males possess mean earnings approaching their mean occupational index. Both nonwhite male and female earnings are less than expected from their occupational distribution. Does the market then discriminate with respect to earnings within occupation? The following analysis should help to answer this question.

Methodology

Because of data limitations, empirical inquiries into earnings dis[illegible]nation processes are usually limited to the comparative analysis of the regression estimates of such reduced form models as (2.1) (see page 6). In an effort to isolate the variety of mechanisms implicit in such reduced form arguments, a structural form earnings model of the logarithmic specifications:[4]

$$(3.1)\quad \ln O_{ij} = \beta_{0j} + \beta_{1j}A_{ij} + \beta_{2j}S_{ij} + \beta_{3j}V_{ij} + \beta_{4j}X_{ij} + \beta_{5j}X^2_{ij} + \beta_{6j}M_{ij} + e_{ij}$$

$$(3.2)\quad \ln Y_{ij} = \gamma_{0j} + \gamma_{1j}A_{ij} + \gamma_{2j}S_{ij} + \gamma_{3j}V_{ij} + \gamma_{4j}X_{ij} + \gamma_{5j}X^2_{1j} + \gamma_{6j}M_{ij} + \gamma_{7j}E_{ij} + \gamma_{8j}O_{ij} + u_{ij}$$

was estimated for each of the three sample groups, where:

$\ln O_{ij}$ = occupational index, logarithm of mean weekly earnings of employed wage earners in 10 occupations.

$\ln Y_{ij}$ = logarithm of reported weekly earnings for the ith individual of the jth race.

A_{ij} = adult performance level (1,2 or 3).

S_{ij} = years of formal schooling.

V_{ij} = years of vocational education.

X_{ij} = residual experience estimate (AGE - SCH - 5).

M_{ij} = metropolitan-nonmetropolitan binary; metro = 1, nonmetro = 0.

E_{ij} = full employment binary; fulltime employed = 1, parttime = 0.

In order to capture the relative strengths of the cognitive-noncognitive schooling linkages both schooling and achievement are included as explanatory argument. A quadratic experience term is also employed,

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[4]Heckman and Polachek (1974) found "that among simple transformations the natural logarithm of earnings is the correct dependent variable." This conclusion is also supported by Kelland (1978).

because of the hypothesized parabolic nature of the experience-earnings profile.

In an effort to isolate the relative importance of the components of the school-earnings relationship for the demographic groups, a comparative path analysis will be conducted (see Duncan, 1969; Weiss, 1970; and Psacharopoulos and Tinbergen, 1978). As depicted in Figure 2, the structural form model presented above characterizes for possible linkages between schooling and earnings; (1) a cognitive interoccupational component (school-APL-occupation-earnings); (2) a cognitive intraoccupational component (school-APL-earnings); (3) a noncognitive interoccupational component (school-occupation-earnings); and (4) a noncognitive intraoccupational component (school-earnings).

Path analysis of these school-earnings linkages would typically require the ordinary least squares estimation of the three structural equations:

$$(3.0) \quad A_{ij} = \alpha_{0j} + \alpha_{1j}S_{ij} + e_{ij}$$

$$(3.1) \quad \ln O_{ij} = \beta_{0j} + \beta_{1j}A_{ij} + \beta_{2j}S_{ij} + \ldots + \varepsilon_{ij}$$

$$(3.2) \quad \ln Y_{ij} = \gamma_{0j} + \gamma_{1j}A_{ij} + \gamma_{2j}S_{ij} + \gamma_{3j}V_{ij} \ldots + \mu_{ij}$$

Because of the peculiarities of these data the usual approach may not be appropriate here. In this case the achievement variable in question is a discrete measure limited to the values 1, 2 or 3. Its use as a dependent variable in the estimation of 3.0 would, therefore, yield estimates of α that are not efficient.[5] This problem of a limited dependent variable

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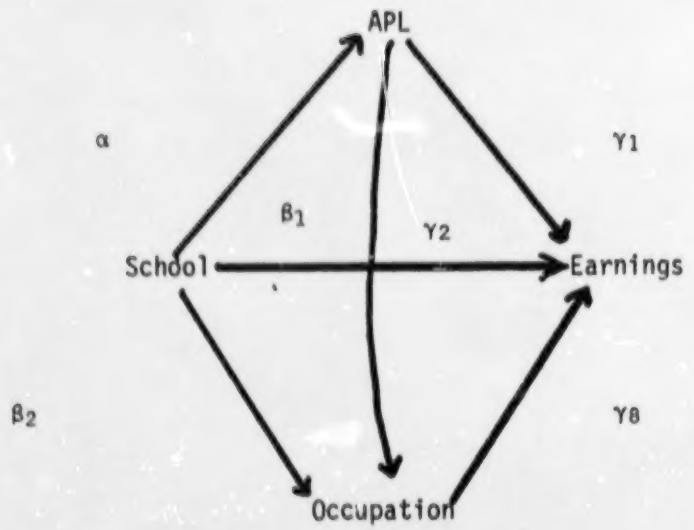
5 The estimated standard error of α would be biased and the resultant "t" ratios would be meaningless. For further explanation of the case of a limited dependent variable see Kmenta (1971, pp. 425-430).

Figure 2

Path Analysis for the Structural Form of the Earnings Model



can be avoided by the use of a chi-square contingency test of the relationship hypothesized in (3.0) (Reynolds, 1977). To facilitate intergroup comparisons the chi-square statistics can be corrected for sample size by the calculation of Cramer's V contingency coefficients for the school-APL component for each of the four groups (see Figure 2). The assumption that the error terms of (3.1) and (3.2) are independent, allows the use of ordinary least squares estimation of the remaining components. These estimates will be converted to normalized "beta" coefficients to facilitate intergroup comparisons.

Findings

Using the ORC survey data, I have estimated the structural-form earnings model as presented in (3.1) and 3.2) for each of the population groups. The ordinary least squares regression results for these equations are recorded in Table 3.

An examination of the IOP equation reveals that schooling is a significant mechanism for improving occupational position for only the females. The APL-IOP linkage is statistically significant for each group. However, for white females the impact of achievement on occupation is negative. Thus increased competency, as measured by the APL score, would improve the occupational position of all but the white female group. Experience-occupation profiles are only significant for the females of this survey, with the profile most pronounced for the nonwhite female. While the inter-occupational return to experience for white females peaks at 4.4 years, the nonwhite female's return is ever increasing. Neither of the male groups exhibit statistically significant interoccupational experience profiles. This indicates that tenure is not converted into occupational penetration for males--so while the factors influencing occupational penetration vary

Table 3

Regression Results from the IOP-Earnings Model

	I	APL	SCH	YOC	EXP	EXP^2	MET	EMP	IOP	R^2	F
White Male											
Ln IOP	3.827	0.365 (3.08)***	-0.020 (0.43)	0.135 (1.78)*	0.035 (0.52)	-0.004 (0.71)	-0.080 (0.54)			0.01	2.3**
Ln Earn	0.570	-0.145 (1.60)	0.082 (2.21)**	0.109 (1.87)*	0.156 (2.73)***	0.013 (2.28)**	0.195 (1.70)*	0.156 (2.73)***	0.009 (13.88)***	0.47	73.7***
Nonwhite Males											
Ln IOP	1.066	1.139 (3.03)***	0.014 (0.06)	-0.268 (0.30)	0.220 (0.66)	-0.001 (0.02)	1.42 (1.93)*			0.18	4.8***
Ln Earn	1.625	0.745 (5.15)***	-0.190 (2.02)**	0.601 (1.76)*	-0.134 (1.06)	0.016 (1.23)	0.081 (0.29)	-0.134 (1.06)	0.020 (9.81)***	0.86	83.0***
White Females											
Ln IOP	-1.427	-0.271 (1.76)*	0.348 (4.80)***	0.617 (2.66)***	-.504 (4.54)***	-0.045 (3.69)***	0.386 (1.35)			0.17	17.4***
Ln Earn	0.688	0.434 (5.85)***	-0.181 (4.65)***	0.161 (1.42)	0.524 (9.31)***	0.052 (8.46)***	0.540 (3.97)***	1.945 (17.42)***	0.012 (22.83)***	0.77	196.2***
Nonwhite Females											
Ln IOP	0.846	0.381 (1.73)*	0.446 (3.77)***	1.418 (3.95)***	-0.924 (3.54)***	0.106 (3.51)***	-2.548 (5.60)***			0.27	12.1***
Ln Earn	-0.444	0.211 (2.32)**	0.083 (1.59)	0.713 (4.73)***	-0.528 (4.25)***	0.065 (4.76)***	0.161 (0.77)	2.500 (13.57)***	0.012 (8.49)***		

* coefficient significant at .10 level
** coefficient significant at .05 level
*** coefficient significant at .01 level

among the four groups, it remains to be seen how readily the females can convert their occupational "advantage" into an earnings "advantage."

Because of the presence of IOP as an explanatory variable in the earnings equation, the coefficients of the other independent variables included in the estimated equation indicate the significance of their impact within the occupational position. Only in the young white male case does the schooling variable have a significant and positive effect on intraoccupational earnings. For both young nonwhite and young white females the impact of school on earnings is negative. For the nonwhite females, schooling is positively related to earnings, but the coefficient is not statistically significant at the 10 percent level.

Achievement is a statistically significant contributor to intraoccupational earnings for all but young white males. White males are paid regardless of achievement, while the other groups are rewarded only if their schooling generates achievement as measured by APL.

In all cases there is a significant and positive convertibility of occupational advancement into earnings. However, as mentioned above the factors influencing occupational advancement vary among the groups. Along with the differing occupational advancement process we have seen from the preceding regression results, the factors influencing each group's earnings process also vary. This leads to some suspicions as to the comparative effectiveness of alternative earnings determination mechanisms among the four race-sex groups of this sample. By examining more precisely the alternative paths through which schooling may effect earnings among these groups a better understanding of how policy might ultimately impact the earnings of youth can be discerned.

The Earnings Path

The recursive earnings system developed and tested above generates the schematic linkages between schooling and earning shown in Figure 2. The most suitable method for making comparisons of the relative strengths of the alternative linkages between SCH and ERN is the estimation of standardized (beta) coefficients from the regression estimates for (3.1) and (3.2), the variable standard deviations listed in Table 2 and the calculation of Cramer's V.

As discussed previously, the model posits four alternative mechanisms whereby the quantity of schooling may influence weekly earnings. Two of those linkages are within occupation: γ_2, the direct affect of SCH or ERN independent of the other endogenous variables and $\alpha\gamma_1$, the indirect effect of schooling on earnings through achievement as measured by APL. Two of the nexus components are via occupational position: $\beta_2\gamma_8$, the effect of schooling on earnings through occupation and independent of achievement, and $\alpha\beta_1\gamma_8$, the effects of SCH on ERN through both APL and IOP. These compound linkages can be estimated as the product of the component coefficients. This is the same procedure employed by Duncan (1969) for a model that included background characteristics, but which excluded achievement as an estimated argument. The results of this procedure are shown in Figure 3.

Each of the groups enjoy a strong SCH-APL link. This link is especially strong for the two nonwhite groups. Schooling does influence achievement, but does this achievement impact earnings? For three of the groups the answer is yes. Only young white males are unable to convert achievement into earnings. While, two of the groups, white females and nonwhite males, function along a relatively large APL-ERN path.

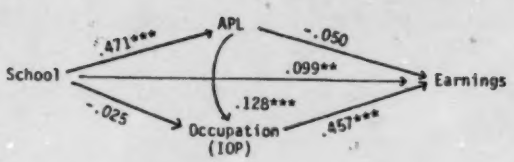
Each of the groups possess significant APL-IOP links. However, this

Figure 3

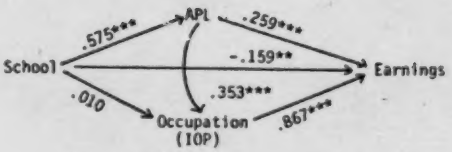
Path Analysis for Race - Sex Groups

MALES

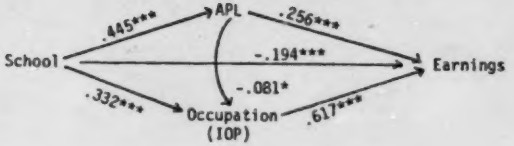
White

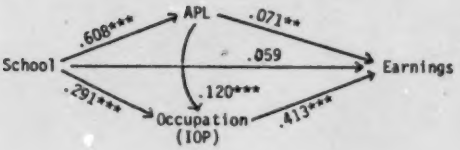


Nonwhite



FEMALES





*** coefficient significant at .01 level
** coefficient significant at .05 level
* coefficient significant at .10 level

link is negative for the white female group. Increased competency is not converted into a better paying occupation, in fact, better able white women would be adversely affected in terms of occupational advancement.

Only females have a significant and positive SCH-IOP link. While, both the white and nonwhite males find that increased schooling does not significantly alter their occupational position. As noted above and again shown in Figure 3, each of the youth groups exhibit large and significant IOP-ERN paths. This path is especially large for white females and nonwhite males.

Finally, we examine the SCH-ERN nexus. As mentioned earlier the pioneering work on the economics of discrimination focused on the role of schooling in the earnings determination process. Emanating from this early work was the policy prescription that increased schooling would eliminate much of the disparity in earnings among race-sex groups. Examination of Figure 3, reveals that this may no longer be the case. Only one of the groups in this study exhibit a significant and positive SCH-ERN link--young white males. For the other groups included, the SCH-ERN path is either significant and negative (white females and nonwhite males) or positive, but insignificant (nonwhite females). Schooling only pays for these groups if it (1) impacts functional competency, i.e., SCH-APL-ERN; or (2) influences occupational penetration, i.e., SCH-IOP-ERN.

As shown in Table 4 the links through which schooling is ultimately converted into earnings differs among the groups studied. In fact, there is no path common to all four groups. This raises serious questions concerning blanket policies directed at alleviating occupational and earnings disparities among diverse groups. In the chapter which follows, a summary of the major findings of this study and policy implications will be presented.

Table 4

Summary of Earnings Path

by Race-Sex Groups

Links	White Males	Nonwhite Males	White Females	Nonwhite Females
(1) SCH-APL-OCC-EARN	+	+	-	+
(2) SCH-APL-EARN		+	+	+
(3) SCH-OCC-EARN			+	+
(4) SCH-EARN	+	-	-	

'+' - indicates significant positive relationship

'-' - indicates significant negative relationship

blank - no relationship

CHAPTER IV

SUMMARY AND POLICY RECOMMENDATIONS

Summary

This researach has reviewed and analyzed the economic status of white and nonwhite, male and female youths in the labor market. A simple, yet fairly sophisticated version of the expanded human capital model was estimated. The model expands upon the "naive" schooling model to include what is felt are relevant omitted independent variables. While no more sophisticated then other recent analyses, this particular study is unique in that the recursive earnings system is subjected to comparative analysis among both race and sex groups and the data include a new measures of human capital quality, functional competency.

In the process of the study we have attempted to isolate the precise mechanisms whereby these groups (1) gain functional competency; (2) obtain their occupational position; and (3) determine their earnings. The breakdown by race and sex is, we feel, an important step in labor market analysis, for as this study reveals, the mechanisms through which the four groups weave their ways through the earnings system are entirely different. Thus, blanket policies designed to treat the occupational and earnings disparities among groups in the same manner are ill conceived.

As shown in Table 4, increased competency as measured by the APL score is critical to labor market success. Competency is especially important to nonwhite youths in achieving occupational status and more importantly in converting this status into increased earnings. The traditional view that additional schooling will lead directly to economic advancement only holds for young white males. They are the only group in which the schooling-earnings path was positive and significant. Matter-of-fact, for two of the

cohorts, nonwhite males and white females, this relationship was significantly negative.

From this research it is evident that schooling which does not impart competency or cognitive skills hinders the economic opportunities of the recepient. In six of the eight cases where an APL path was measured it had a significant and positive impact on increasing one's economic standing. For each of the young race-sex groups, competency was rewarded.

Because of the diverse paths followed by each youth groups, multiple public policies are necessary to improve the economic position of youths. Some of these policies are discussed below.

Policy Recommendations

The most important finding of this study is the critical role of increased functional ability (literacy) for success of youths in the labor market. This adds support to the back to "basics" curriculum being promoted in schools. Without nurturing cognitive skills or knowledge schooling alone, except for white males, is not a key to economic success.

Since the purpose of the APL test was to measure the interrelationship between skills and knowledge areas among a representative sample of the U.S. population, programs designed to improve this interrelationship are needed. Whether this occurs within the school environment or through outreach programs is not important. What is, is that until functional competency improvement programs are made available to youth, they will suffer in the labor market.

REFERENCES

REFERENCES

Arrow, K. S. "Models of Job Discrimination" in A. Pascal, editor. Racial Discrimination in Economic Life. Santa Monica: Rand, 1972, p. 82-102.

Arrow, K. D. "The Theory of Discrimination" in Ashenfelter and Rees, editors. Discrimination in Labor Markets. Princeton: Princeton University Press, 1973, p. 3-33.

Ashelfelter, Orley and Taussig, Michael K. "Discrimination and Income Differentials: Comment." American Economic Review, September, 1971.

Becker, Gary. The Economics of Discrimination. Chicago: University of Chicago Press, 1957.

Becker, Gary. Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. New York: NBER, 1964.

Becker, Gary. Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education, 2nd edition. New York: NBER, 1975.

Becker, Gary S. and Chiswick, Barry R. "Education and the Distribution of Earnings." American Economic Review, May, 1966.

Blinder, Alan S. "Wage Discrimination: Reduced Form and Structural Estimates." Journal of Human Resources, Fall, 1973.

Bowles, Samuel. "Schooling and Inequality from Generation to Generation." Journal of Political Economy, May/June, 1972.

Bowles, Samuel. "Understanding Unequal Economic Opportunity." American Economic Review, May, 1973, p. 346-56.

Bowles, Samuel and Levin, Henry. "The Determinants of Scholastic Achievement: An Appraisal of Some Recent Evidence." Journal of Human Resources, Winter, 1968.

Bowles, Samuel and Nelson, Valeria I. "The Inheritance of the Intergenerational Reproduction of Economic Inequality." Review of Economics and Statistics, February, 1974.

Cain, Glen G. "The Challenge of Segmented Labor Market Theories to Orthodox Theories." Journal of Economic Literature, December, 1976.

Cairnes, J. R. Some Leading Principles of Political Economy. New York: Harper and Brothers, 1874.

Chiswick, Barry. "Schooling and Earnings of Low Achievers: Comment." American Economic Review, September, 1972.

Chiswick, Barry. Income Inequality: Regional Analyses within a Human Capital Framework. New York: NBER, 1974.

Danziger, Sheldon. "Education and the Earnings of Poverty-Area Residents." (Discussion Paper 298-375.) Madison: Institute for Research on Poverty, University of Wisconsin, 1975.

Duncan, Otis. "Inheritance of Poverty or Inheritance of Race?" Moynihan, ed., On Understanding Poverty. New York: Basic Books, 1969.

Dunlop, John T. "The Task of Contemporary Wage Theory." in Taylor, G. W. and Pierson, F., eds. New Concepts in Wage Determination. New York: McGraw-Hill, 1975.

Flanagan, Robert J. "Segmented Market Theories and Racial Discrimination." Industrial Relations, October, 1973.

Freeman, Richard B. "The Effect of Demographic Factors on Age-Earnings Profiles." Journal of Human Resources. Summer, 1979.

Freeman, Richard B. "Why Is There a Youth Labor Market Problem." in The American Assembly, Youth Employment and Public Policy. New York, Spectrum Books, 1980.

Grasso, John T. "The Contributions of Vocational Education, Training and Work Experience to the Early Career Achievements of Young Men." Mimeographed. Columbus: Center for Human Resource Research, The Ohio State University, 1975.

Grasso, John T. and Myers, Steven C. "The Labor Market Effects of Investment in Human Capital." in Andrew I. Kohen, et al. Career Thresholds, Volume 6. Washington, DC: Government Printing Office, 1977.

Griliches, Zvi and Mason, William. "Education, Income and Ability." Journal of Political Economy, June, 1972, p. 572-5103.

Gwartney, James D. "Discrimination and Income Differentials." American Economic Review, June, 1970.

Gwartney, James D. "Discrimination, Achievement and Payoffs of a College Degree." Journal of Human Resources, Winter, 1972.

Hanoch, Giora. "An Economic Analysis of Earnings and Schooling." Journal of Human Resources, Summer, 1967.

Hansen, W. Lee, Weisbrod, Burton and Scanlon. "Schooling and Earnings of Low Achievers." American Economic Review, June, 1970.

Harrison, Bennett. Education, Training and the Urban Ghetto. Baltimore: The Johns Hopkins Press, 1972.

Hause, J. C. "Ability and Schooling as Determinants of Lifetime Earnings." in F. T. Juster, Education, Income and Human Behavior. New York: McGraw-Hill Book Co., 1975.

Haworth, J. G., Gwartney, J. D. and Haworth, C. "Earnings Productivity and Changes in Employment Discrimination During the 1960's." American Economic Review, March, 1975, p. 158-168.

Heckman, James and Polachek, Solomon. "Empirical Evidence on the Functional Form of the Earnings-Schooling Relationship." Journal of American Statistical Association, June, 1974.

Kmenta, Jan. Elements of Econometrics. New York: Mac Millan, 1971.

Kohen, Andrew I. "Determinants of Early Labor Market Success Among Young Men: Race, Ability, Quantity and Quality of Schooling." Mimeographed. Columbus: Center for Human Resource Research, The Ohio State University, 1973.

Marshall, Ray. "The Economics of Racial Discrimination: A Survey." Journal of Economic Literature. September, 1974, p. 849-71.

Masters, Stanley H. "The Effect of Educational Difference and Labor-Market Discrimination on the Relative Earnings of Black Males." Journal of Human Resources, Summer, 1974.

Mincer, Jacob. "On-the-job Training: Costs, Returns and Some Implications." Journal of Political Economy, October, 1962.

Mincer, Jacob. "The Distribution of Labor Incomes: A Survey with Special Reference to the Human Capital Approach." Journal of Economic Literature, March, 1970.

Mincer, Jacob. Schooling, Experience and Earnings. New York: NBER, 1974.

Northcutt, et al. Adult Functional Competency: A Summary. The University of Texas at Austin for Bureau of Occupational and Adult Education, Office of Education, U.S. Department of Health, Education and Welfare, 1975.

O'Neill, Dave M. "The Effect of Discrimination on Earnings: Evidence from Military Test Results." Journal of Human Resources, Fall, 1970.

Opinion Research Corporation (ORC). Adult Performance Level Functional Literacy Test. Harrison, NJ: ORC, 1974.

Psacharopoules, George and Tinbergen, Jan. "On the Explanation of Schooling, Occupation and Earnings: Some Alternative Path Analyses, De Economist, Volume 126, No. 4, 1978.

Reynolds, H. T. Analysis of Nominal Data. Beverly Hills, CA: Sage Publications, 1977.

Sahota, Gian Singh. "Theories of Personal Income Distribution: A Survey." Journal of Economic Literature, March, 1978.

Solomon, Lewis C. "The Definition and Impact of College Quality." in L. C. Solomon and Paul J. Taubman (eds.), Does College Matter? Some Evidence on the Impacts of Higher Education. New York: Academic Press, 1973.

Taubman, Paul and Wales, Terrence. Higher Education and Earnings: College as an Investment and Screening Device. New York, NBER, 1974.

Thurow, Lester C. Poverty and Discrimination. Washington, DC: Brookings Institution, 1969.

Thurow, Lester C. "Education and Economic Equality." Public Interest, Summer, 1972, p. 61-81.

U. S. Bureau of the Census. Current Population Reports, Series P-23, No. 66 Characteristics of American Children and Youths: 1976. Washington, DC: U. S. Government Printing Office, 1978.

U. S. Bureau of the Census. Survey of Income and Education, 1976/Machine-readable data file/. Washington, DC: The Bureau (producer and distributor), 1976.

Vietorisz, Thomas and Harrison, Bennet. "Labor Market Segmentation: Positive Feedback and Divergent Development." American Economic Review, May, 1973, p. 366-76.

Vroman, John and Greenfield, Stuart. "A Missing Link in the Heroic Schooling Model" Journal of Human Resources, Summer, 1978.

Wachtel, Howard and Betsey, Charles. "Employment at Low Wages," Review of Economics and Statistics, May, 1972, p. 121-129.

Wachtel, Howard and Betsey, Charles. "Low Wage Workers and the Dual Labor Market: An Empirical Investigation." Review of Black Political Economy, Spring, 1975.

Wachtel, Paul. "The Returns to Investment in Higher Education: Another View." in F. T. Juster (ed.), Education, Income and Human Behavior. New York: McGraw-Hill Book Co., 1975.

Wachter, Michael L. and Kim, Choongsoo. "Time Series Changes in Youth Joblessness." NBER Working Paper No. 384. Cambridge, MA: NBER, 1979.

Weiss, Randall. "The Effect of Education on the Earnings of Blacks and Whites." Review of Economics and Statistics, May, 1970.

Welch, Finis. "Black-White Differences in Returns to Schooling." American Economic Review, December, 1973, p. 893-907.

Welch, Finis. "Effects of Cohort Size on Earnings." Journal of Political Economy, p. 565-598, 1979

Welland, Jon D. "Cognitive Abilities, Schooling and Earnings: The Question of Functional Form." Review of Economics and Statistics, November, 1978.

APPENDIX A

ADULT PERFORMANCE LEVEL

1973 - 74

A Test Conducted for

The University of Texas at Austin

By

Opinion Research Corporation

Princeton, New Jersey

March, 1974

INTRODUCTION

The following sections describe the sampling procedure used by Opinion Research Corporation in gathering data in support of the Adult Performance Level Project at The University of Texas, (Northcutt, 1975). Funding for this project came from a grant by the U.S. Office of Education. This report describes the procedure used to get a representative sample of U.S. adults. At the same time, based on funding from the Texas Education Agency and the Governor's Office, the Adult Performance Level Project contracted with Opinion Research Corporation to apply the same procedures to obtain representative data for the State of Texas.

About the Study

The study was sponsored by the Division of Extension, The University of Texas at Austin, under a grant from the United States Office of Education. The University of Texas contracted with Opinion Research Corporation (ORC) to act as data collection agent for the survey.

The purpose of the survey was to define and assess those skills identified as being important for survival in our society. In order to be successful, an adult must achieve a minimum level of competency within each of at least six areas: occupational knowledge, consumer economics, health, community resources, government and law, and transportation. The present survey focuses on two of these areas: occupational knowledge and consumer economics.

The Role of ORC

Working with tests developed by the Division of Extension, ORC formatted and printed field materials for administration of the tests to nationwide samples of adults by interviewers.

ORC prepared instructions for interviewers, supervised the field work, edited the correctness of respondents' performance on a number of tasks called for in the test, and reproduced results on punch cards and magnetic tape. Results of each were also presented in computer print-out form by demographics

Using ORC's Master Sample, testing was conducted in person with two probability samples each containing 1,500 adults, representative of the population 18 through 65 years of age in the coterminous United States. All tests were conducted in the homes of respondents.

Testing Dates

Testing started on December 8, 1973, and was completed on January 29, 1974.

SAMPLE DESIGN

Description of the Master Sample

The ORC Master Probability Sample is designed to represent the continental United States, excluding Alaska and Hawaii.

In its basic design the sample consists of 360 counties, arranged in six "blocks" of 60 counties each. Each of the six blocks is an independent sub-sample representing the United States. The counties making up each block were chosen at random with probability proportional to size of population from the 3,070 counties that made up the nation at the time the sample was drawn.

Prior to the selection of sample counties, geographical stratification was introduced. All 3,070 counties were grouped into 171 areas of contiguous counties, as designated by the Office of Business Economics of the U.S. Department of Commerce. The 171 area groups were then arranged in georgraphical order from north and east to south and west -- from Maine to California -- and within each area the counties were arranged in descending order of population.

Within the resulting array the 60 individual sample counties making up each block were selected by systematic methods, with random start points, to insure representative geographical distribution. The process was carried out six times to provide the six blocks that make up the entire master sample. The selections were made, and documented, on an IBM 360/65 digital computer.

It will be noted that in this process the sampling unit is a county, and that a given county may appear in the sample more than once, either because of its large population or because it was selected by chance in more than one of the six blocks.

The sample is updated annually to reflect changes in population. The latest updating reflects 1973 population estimates.

The sample has a number of desirable properties:

1. It can be used as a whole, or subsamples can be taken by choosing any one or any combination of the six blocks into which the master sample is divided. Each of the six blocks is itself a national probability sample. Such subsamples are mutually consistent, and can be added or compared. This layout for the master sample provides flexibility in size, so that sample size in each instance can be varied to suit the need for precision of any particular research inquiry.
2. The whole sampling method is both statistically and administratively of maximum efficiency. Its intent is to provide the most reliable data from any given expenditure.
3. The sample is fully documented, and reproducible in a scientific sense. It can be updated in a straight-forward way, easily and logically, as the population changes with time.

Within each county a minor civil division was selected, with probability proportionate to size, and defined to be the primary sampling unit.

The procedure consists of selecting a listed household using random techniques. Nonoverlapping telephone directories are used for locating starting points. No interviews are conducted in these households, for the interviewer begins her screening at the household immediately to the left of the listed one.

Each starting point effecitvely determines a neighborhood in which interviewing will be conducted. Since there is local variation in the incidence of listed households, weighting is introduced to equalize the probabilities of selecting starting points.

Application of the Master Sample in the Current Study

The universe for the two test administrations was defined as the nationwide population 18 through 65 years of age, living in households, who are physically able to read and write.

Three blocks of the master sample, 60 locations in each, were employed in the study. In each of these 180 locations two starting points were selected, one for the Occupational Knowledge Test and one for the Consumer Economics Test.

In each location a fixed number of housing units were assigned for contact, beginning at the housing unit adjacent to the starting point and continuing on a fixed route.

Within households respondents were selected for testing following probability sampling procedures.

Up to two calls were made at each household, where necessary, to complete the test with the designated respondent.

At the conclusion of each test, respondents were asked the likelihood of their being away from home at the time of the interviewer's visit. This information provided input for a weighting procedure that corrects for "at-homeness."

As an incentive for cooperation, respondents were given silver dollars in presentation cases.

Weighting

Weighting was introduced to correct for:

- local variation in the incidence of telephone listed households
- different probabilities of selecting respondents in households with varying numbers of eligible respondents

- the probability of a respondent's being at home at the time of the interviewer's visit
- varying completion rates in certain subgroups of the population: region, education, family income, age and sex.

Sample Composition

Following are the characteristics of the weighted samples for the two tests, compared with ORC estimates of the universe represented by each samples. Universe estimates are based on most recent U.S. Census data.

	Universe	Occupational Knowledge	Consumer Economics
Men	47%	47%	47%
Women	53	53	53
18-29 years	34%	35%	35%
30-39	19	19	18
40-49	20	19	19
50-59	19	18	19
60-65	8	9	9
Education:			
8th grade or less	22%	21%	21%
High school incomplete	17	20	18
High school complete	37	38	37
Some college	24	21	23
Metropolitan areas	73%	72%	72%
Nonmetropolitan	27	28	28
Northeast	24%	25%	24%
North Central	27	27	27
South	31	30	30
West	18	18	19
Family income:			
Less than $5,000	26%	22%	22%
$5,000-$6,999	9	9	10
$7,000-$9,999	16	17	16
$10,000-$14,999	23	23	23
$15,000 or more	26	26	26
White	89%	82%	84%
Nonwhite	11	17	16

(Nonresponse omitted)